

Transport and health – opportunities for a healthier Canterbury

Prof Simon Kingham

Professor of Geography and Director of the
GeoHealth Laboratory

Pegasus Health Lunchtime Seminar Series
Christchurch, October 14th 2015

Who am I?

- University Professor
 - Teacher and Researcher
- Local Transport involvement
 - Regional Transport Committee
- Christchurch resident for 15 years
- Commuter & utility cyclist
- Husband and father



Talk today

-
- Fact or fiction
 - What is healthy transport?
 - Why should health professionals be interested in transport?
 - What can we do to encourage health transport choices?

FACT OF FICTION

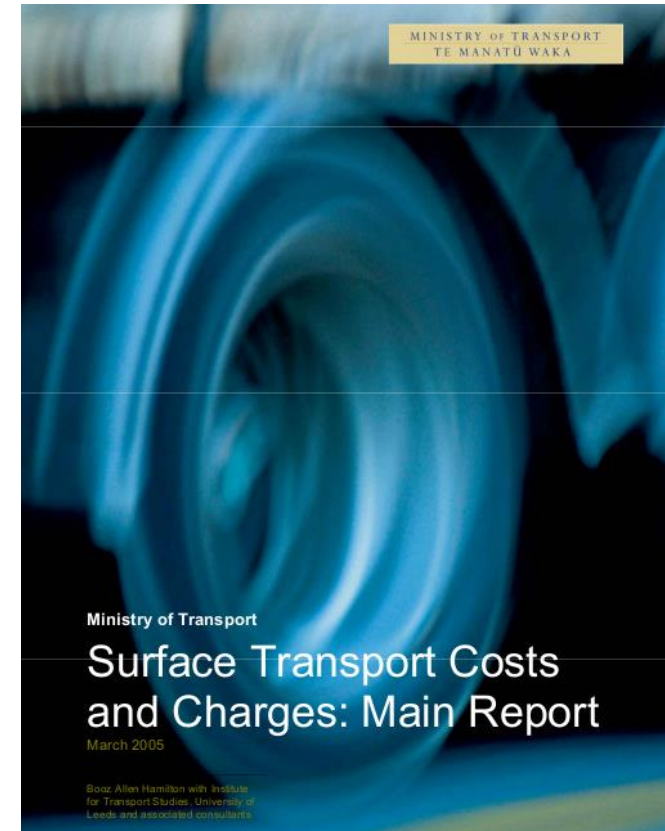
Tax-paying car drivers subsidise others

FACT OF FICTION

Who pays?

- cars directly pay 64% of their costs
- trucks directly pay 56% of their costs
- buses directly pay 68% of their costs
- rail users directly pay 77% of their costs

Does not include exercise-related health!



Congestion is all bad

FACT OF FICTION

Congestion isn't all bad!

- Congestion suppresses latent travel demand
- Congestion encourages less travel or use of alternative modes
 - Strongest when good alternatives
- Congestion-free roads don't result in pollution as low as the models tell us

Congestion isn't all bad!

Cheonggyecheon, Seoul, Korea



Before (<http://www.kcet.org/socal/departures/landofsunshine/la-river/from-freeways-to-waterways-what-los-angeles-can-learn-from-seoul.html>)

Congestion isn't all bad!



<http://www.kcet.org/socal/departures/landofsunshine/la-river/from-freeways-to-waterways-what-los-angeles-can-learn-from-seoul.html>

Congestion isn't all bad!

1970



2005



Congestion isn't all bad!



Congestion isn't all bad!

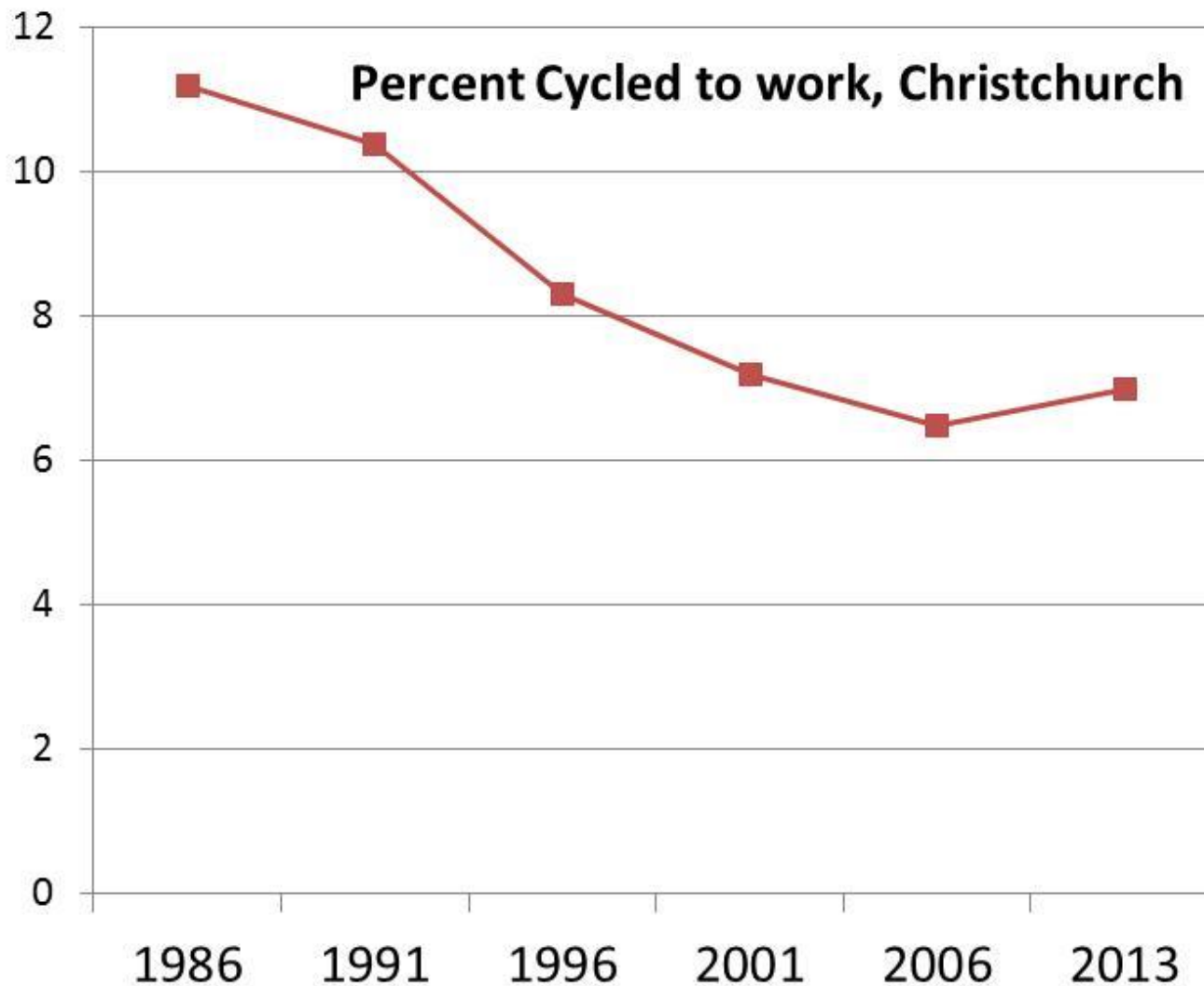


Where did the traffic go?

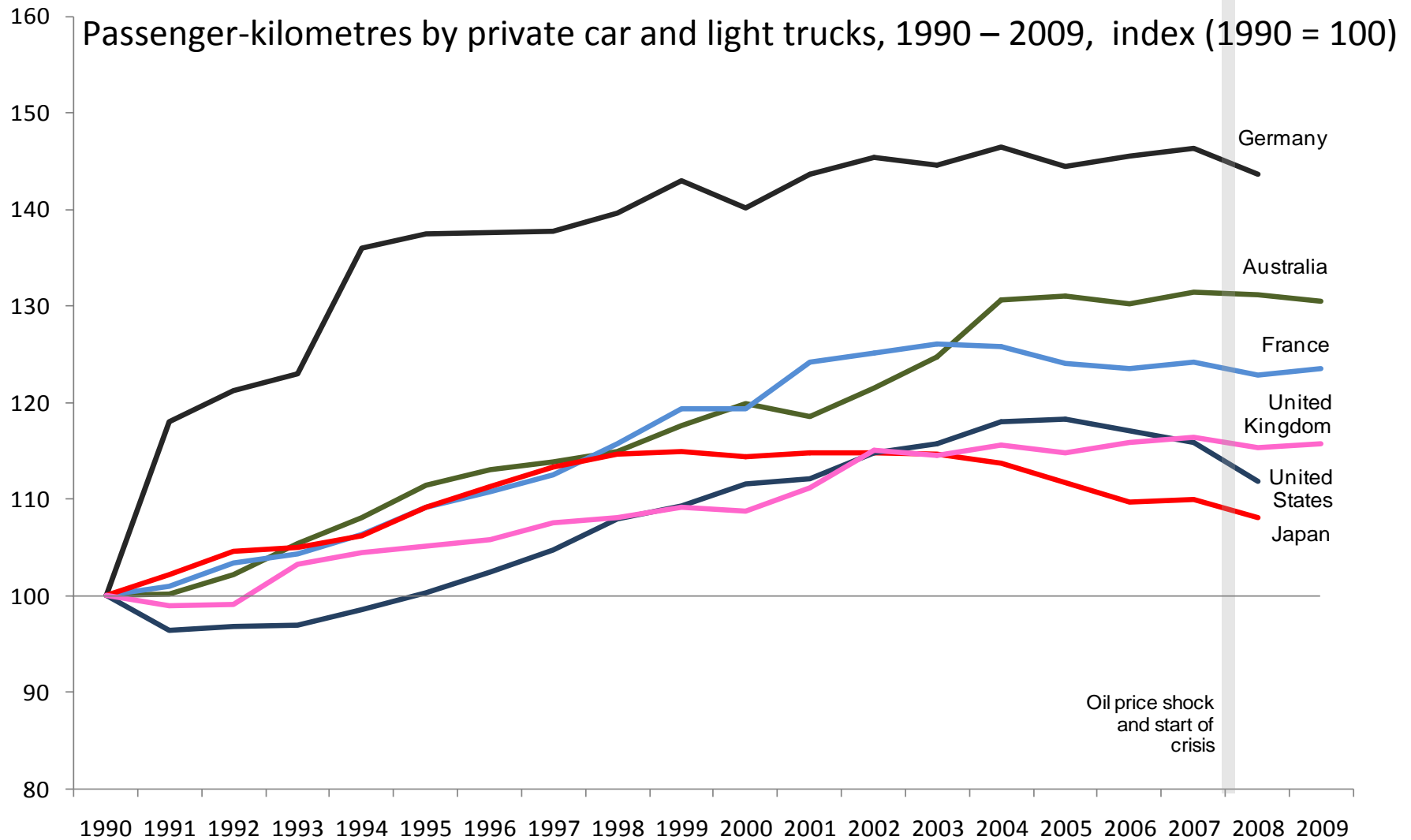
“It just disappeared” - Prof Jeff Kenworthy

We have to plan for growing car use
FACT OF FICTION

Context

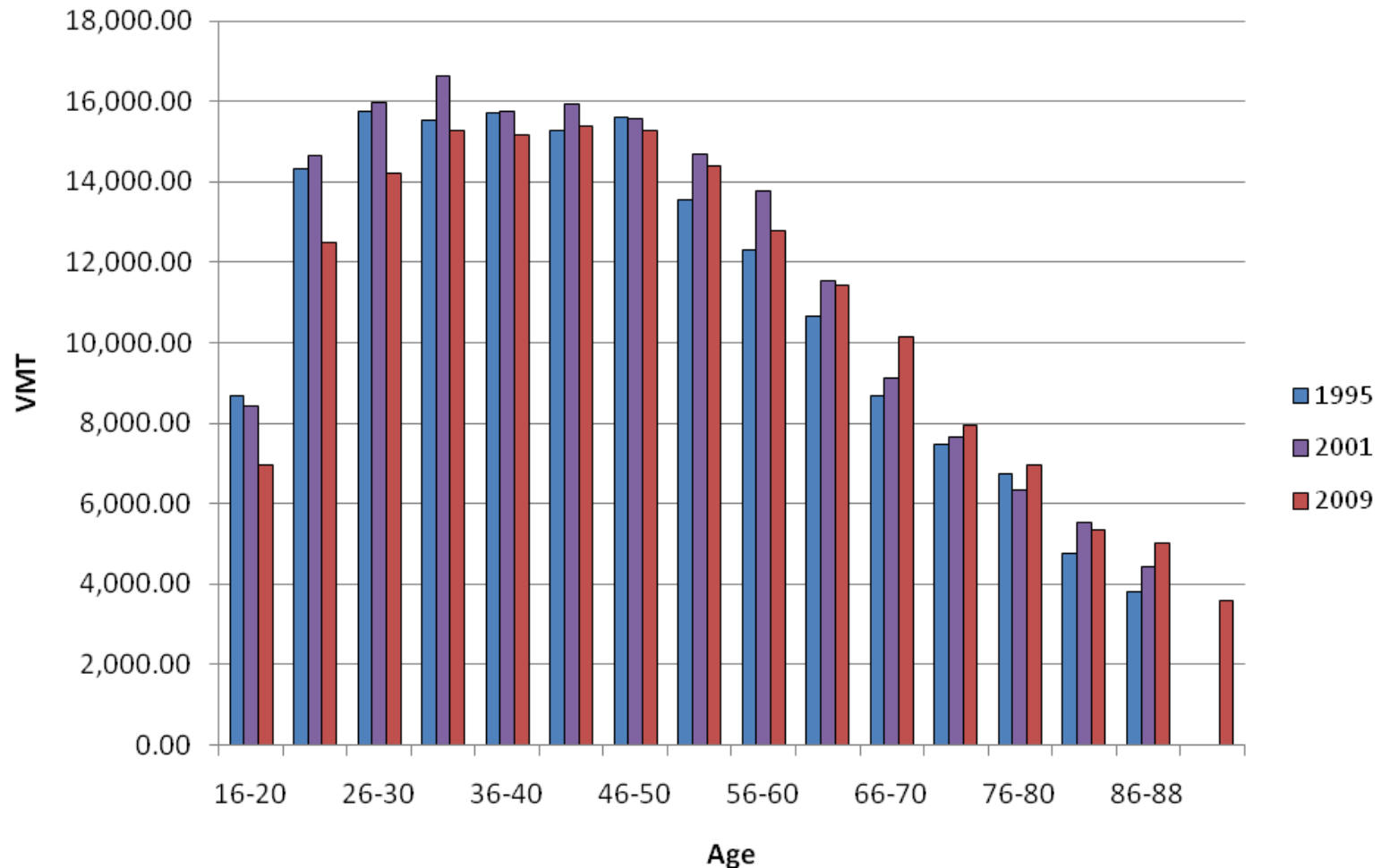


Peak car



Peak car and age

Annual vehicle miles per driver by age, USA, 1995, 2001, 2009



Peak car

... especially younger people ...

AUTOS TEEN DRIVERS

The teenage dream of owning a car is dying

The New Zealand Herald

Search

by Mark Penn

@mark_penn

JULY 22, 2015, 9:59 AM EDT

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Brian Rudman's Opinion

Brian Rudman is a NZ Herald feature writer and columnist.

Email Brian

Brian Rudman: End of the road for the sacred car?

9:30 AM Friday Jun 6, 2014

89 comments

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As New Zealand's largest roading project roars ahead, people are using their vehicles less and their legs more

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Death of the car: Why Generation Y is turning to public transport

MICHAEL FORBES

Last updated 05:00, June 12 2015



People want to drive
FACT OF FICTION

**Strong &
fearless**



**Interested but concerned
~ 50 - 60%**

**Not able or not
interested ~33%**



**Enthusied &
confident**

Roger Geller's 4 types of cyclist

<http://www.portlandoregon.gov/transportation/44597?a=237507>

We have to accommodate people's
desire for cars

FACT OF FICTION

"Share An Idea"

Make cycling much safer with dedicated bike paths separated from cars on most routes. Only

exper
ride at

Graham

Everything about our city can be geared to making it seen as the best city in the world for cycling (other great things follow)

gareth *ilam*

Seperate cycleways (like copenhagen) linking suburbs and city and making cycling pleasant!

Hilary *Cashmere*

Bicycle highways - just for bikes - into the city. Make cycling in to work, or out to the beach on the weekend, and fun.

summer

Build widened cycling tracks to encourage more people to bike instead of drive. This will also persuade people to not cycle the footpath.

Ruijia *Merivale*



shareanidea.org.nz

Separate the cycle ways from the cars so cyclists are safer, which would encourage cycling as a greener way of getting about.

Elizabeth *Lower Hutt*

More walking or cycling-only areas in a compact area with good parking around it. Separate cycle ways where possible.

Simon

WHAT IS HEALTHY TRANSPORT?





Commuting by Public Transit and Physical Activity: Where You Live, Where You Work, and How You Get There

Ugo Lachapelle, Larry Frank, Brian E. Saelens, James F. Sallis, and Terry L. Conway

Background: Most public transit users walk to and from transit. We analyzed the relationship between transit commuting and objectively measured physical activity. **Methods:** Adults aged 20 to 65 working outside the home ($n = 1237$) were randomly selected from neighborhoods in Seattle and Baltimore with high or low median income and high or low mean walkability. Mean daily moderate-to-intensity physical activity (MPA) were regressed on frequency of transit use, adjusting for demographic factors and enjoyment of physical activity. **Results:** Stratification by neighborhood walkability was used to assess moderating effect of walkability on the relationship between transit use and MPA. Associations between transit commuting and self-reported days of walking and work were assessed using Chi Square tests. **Results:** Regardless of neighborhood walkability, transit commuting accumulated more MPA (approximately 5 to 10 minutes) than nontransit commuting near home and near the workplace than transit nonusers. Enjoyment of walking was a significant predictor of MPA.

Relation Between Higher Physical Activity and Public Transit Use

Brian E. Saelens, PhD, Anne Vernez Moudon, Dr es SC, Bumjoon Kang, PhD, Philip M. Huvitz, PhD, and Chuan Zhou, PhD

Physical inactivity is prevalent and a worldwide public health concern.¹ Increasing active transport is an appealing strategy to increase overall physical activity, although more clarity is needed on the relationship between transit use and physical activity.

Objectives. We isolated physical activity attributable to transit use to examine issues of substitution between types of physical activity and potential confounding of transit-related walking with other walking.

Methods. Physical activity and transit use data were collected in 2008 to 2009 and Community study participants from King County, Washington, were equipped with an accelerometer, a portable Global Positioning System (GPS) travel log. Physical activity was classified into walking and nonwalking time. Analyses compared transit users and nonusers, between less and more transit use, and between transit and nontransit days for walking and nonwalking time.

Transit users had more daily overall physical activity and more total walking time than nonusers but did not differ on either non-transit-related walking or nonwalking activity. Most frequent transit users had more walking time than nontransit users. Higher physical activity levels for walking were observed on transit days, with 14.6 minutes (12.4 minutes less) of daily physical activity directly linked with transit use.

Walking Associated With Public Transit: Moving Toward Increased Physical Activity in the United States

Amy L. Freeland, PhD, Shailendra N. Banerjee, PhD, Andrew L. Dannenberg, MD, MPH, and Arthur M. Wendel, MD, MPH

The health benefits of physical activity have been well documented;¹⁻⁴ still, only 64.5% of Americans are physically active, and 25.4% do not participate in leisure time physical activity at all.⁵ Inadequate physical activity contributes to numerous health problems, causing an estimated 200 000 annual deaths in the United States and significantly increasing medical costs.⁶ In contrast, average annual medical expenditures are 32% lower among physically able adults who get regular exercise than the expenditures of those who lead a sedentary lifestyle.⁷

Objectives. We assessed changes in transit-associated walking in the United States from 2001 to 2009 and documented their importance to public health.

Methods. We examined transit walk times using the National Household Travel Survey, a telephone survey administered by the US Department of Transportation to examine travel behavior in the United States.

Results. People are more likely to transit walk if they are from lower income households, are non-White, and live in large urban areas with access to rail systems. Transit walkers in large urban areas with a rail system were 72% more likely to transit walk 30 minutes or more per day than were those without a rail system. From 2001 to 2009, the estimated number of transit walkers rose from 7.5 million to 9.6 million (a 28% increase); those whose transit-associated walking time was 30 minutes or more increased from approximately 2.6 million to 3.4 million (a 31% increase).

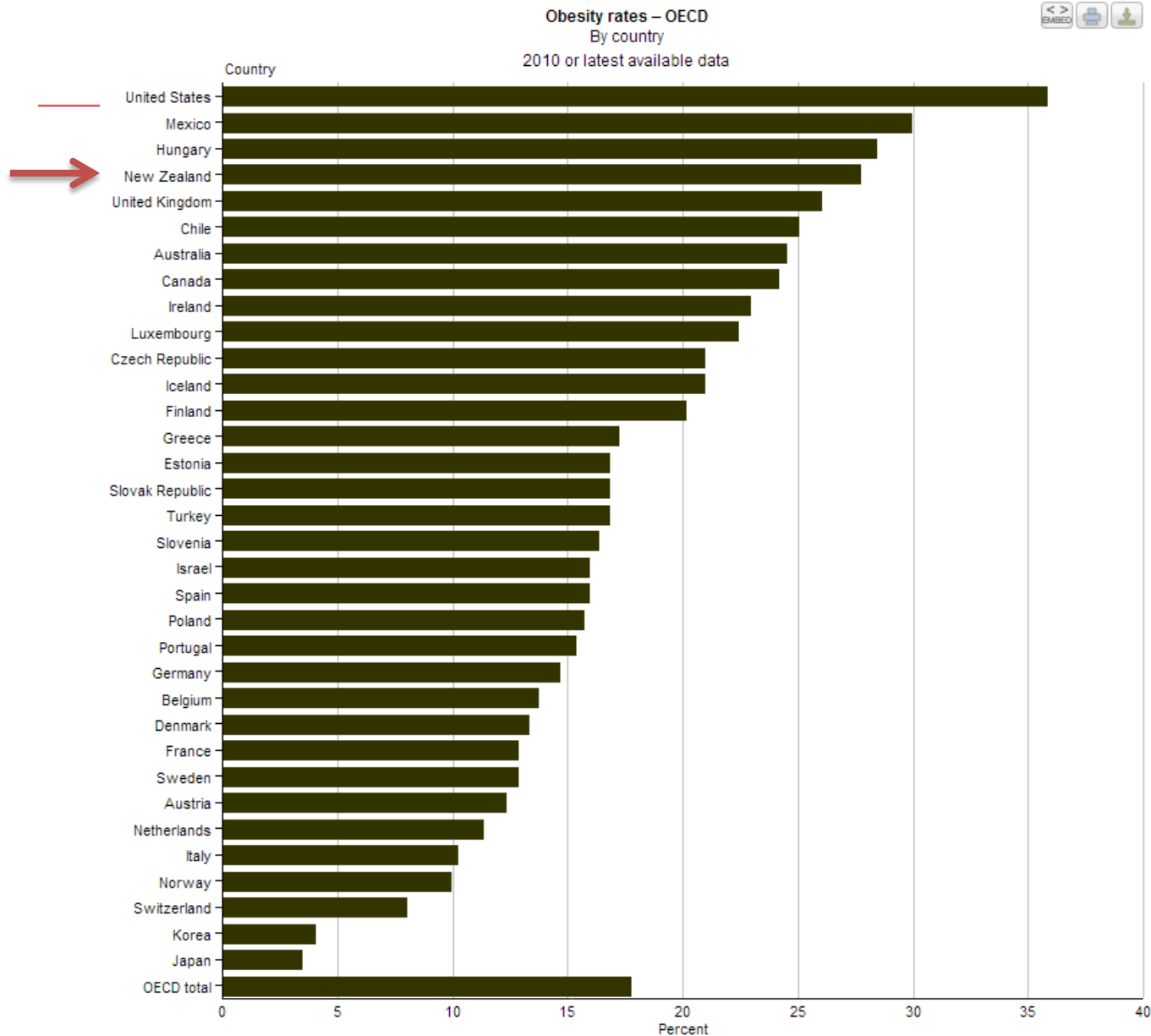
WHY SHOULD HEALTH PROFESSIONALS BE INTERESTED IN TRANSPORT?

Obesity

"New Zealand is in the grip of a global obesity epidemic, the future costs of which will be enormous, potentially unaffordable for the health system."

- Professor Norman Sharpe, New Zealand Heart Foundation medical director, Sept 2011 www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10752121

What level of impact



NZ Medical Association report

NZ Medical Association report (June 2014) recommends:

- Doctors should give obese healthy living advice and tell them to exercise
- Expand nutrition and exercise programmes
- Stop unhealthy food marketing aimed at children
- Tax sugary beverages
- Bring in a consistent and easy-to-use food labelling system
- Food and nutrition guidelines for school canteens and hospitals
- Nutrition part of school curriculum
- Licensing of fast food premises
- Make urban environments support physical activity
- Possibly expand health target for pregnant women to all

WHAT MAGNITUDE?

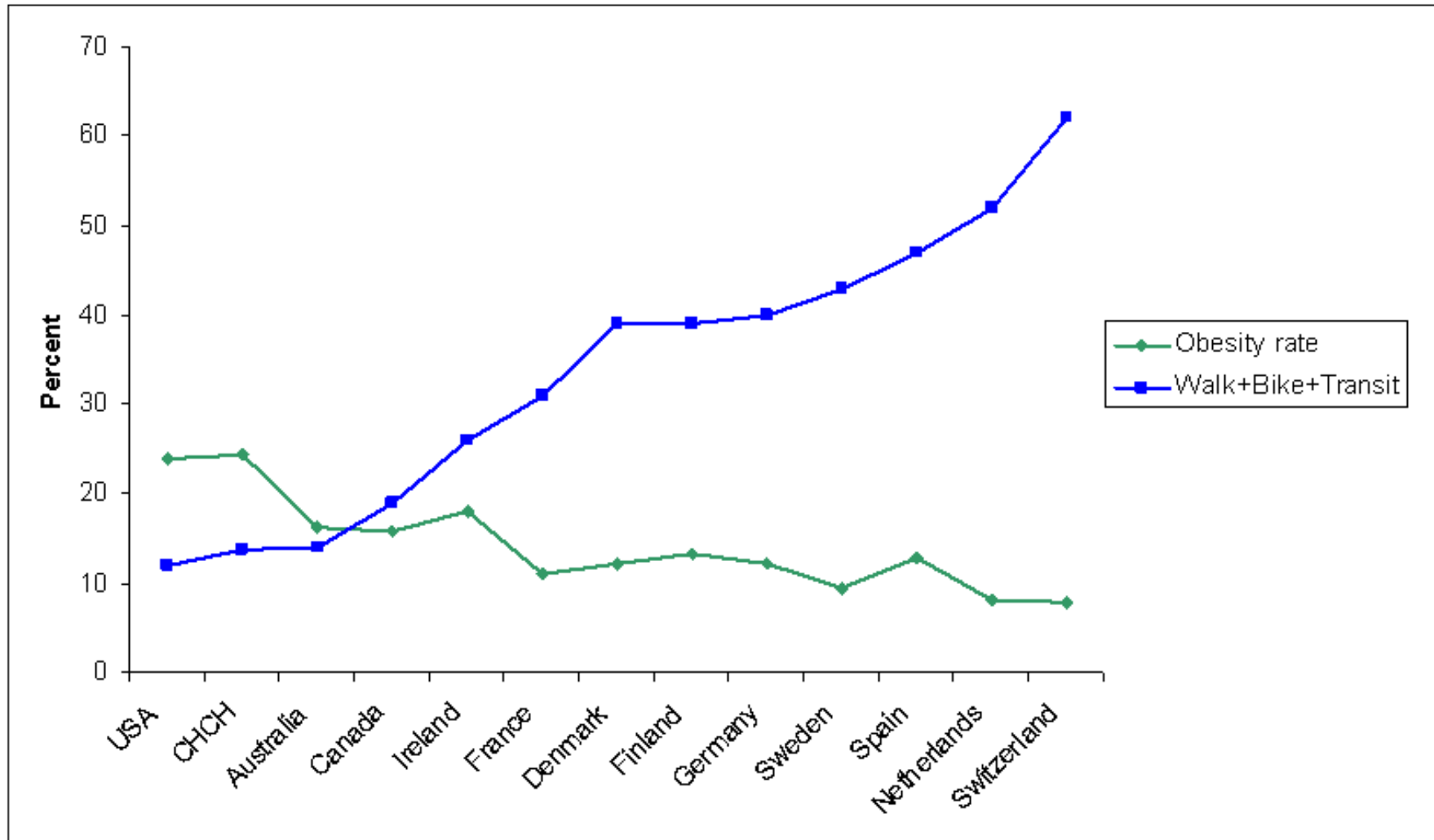
What level of impact

- Obesity costs NZ \$622m per year* in health costs alone (+ \$98-\$222m lost productivity)#
- That equates to \$64m in Christchurch for health costs (+ \$10-\$23m in lost productivity)

* *Based on 2006 figures*

Lal et al, 2012, Health care and lost productivity costs of overweight and obesity in New Zealand. Aust NZ J Public Health. 2012; 36:550-6

What level of impact



Source: Bassett et al, 2008, Walking, Cycling, and Obesity Rates in Europe, North America, and Australia. *Journal of Physical Activity & Health* 5 (6):795-814.

What level of impact

If Christchurch's obesity rates dropped from 33% to:

- 11.4% (Netherlands); we'd save over \$50m p.a.
- 20% - we'd save over \$30m p.a.
- 25% - we'd save over \$20m p.a.

But what's the link between cycling and obesity rates?

Obesity

Belfast
Telegraph.co.uk Friday 27 March 2015

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Active commuters 'have lower BMI'

Flint et al, 2014, Associations between active commuting, body fat, and body mass index: population based, cross sectional study in the United Kingdom. BMJ 349, 4887

Declining Walkability Plays a Big Role in China's Obesity Problem

- Over 20% of all overweight or obese people in the world are Chinese
- Walkable urban design tied to walking for commuting, non-commuting and exercise

Source: Alfonzo et al, Walking, obesity and urban design in Chinese neighborhoods. Preventive Medicine, 2014

 www.bbc.com/news/world-europe-34498871



00:08 / 03:05



Dutch cyclists have longer lives say researchers

11 October 2015 Last updated at 03:40 BST

Researchers at the University of Utrecht say that Dutch cyclists live longer than people who do not use a bike.

They say the evidence proves that cycling is not just good for your health but adds an average of six months to life expectancy.

Longer life



THE INDEPENDENT FRIDAY 27 MARCH 2015

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Sport > Others > Cycling

The secret of eternal youth: skin-tight Lycra and a bicycle

Pollock et al, 2015, An investigation into the relationship between age and physiological function in highly active older adults. The Journal of Physiology 593, 3, 657

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04 JUNE 2014

Bicycling the 'happiest' form of transport

A study found that people are in the best mood while they are bicycling, compared to any other mode of transportation.

Morris EA and Guerra E, 2014, Mood and mode: does how we travel affect how we feel? *Transportation* 42, 25-43.

Cities

Resilient cities

Cities with physically active residents more productive as well as healthier

Increasing amount of green space and promoting walking, cycling and use of public transport has significant economic benefits, study concludes

Peter Walker

 @peterwalker99

Tuesday 9 June 2015 00.01 BST



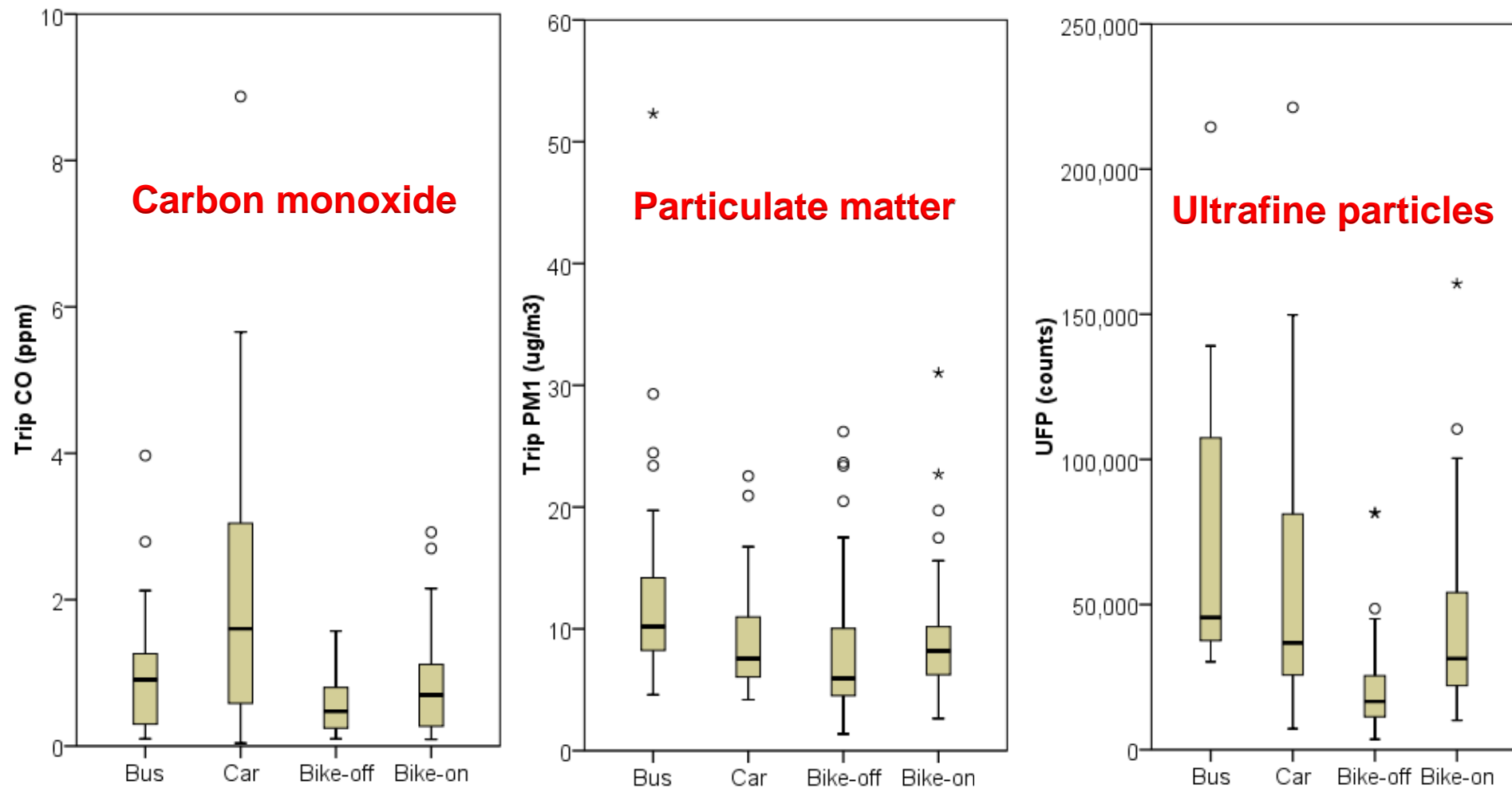
Traffic pollution

Traffic pollution:

- Kills 45 adult Cantabrians per year
- Causes 47,000 restricted activity days among Canterbury
- From PM_{10} costs \$126m per year in Christchurch (\$164m Canterbury)

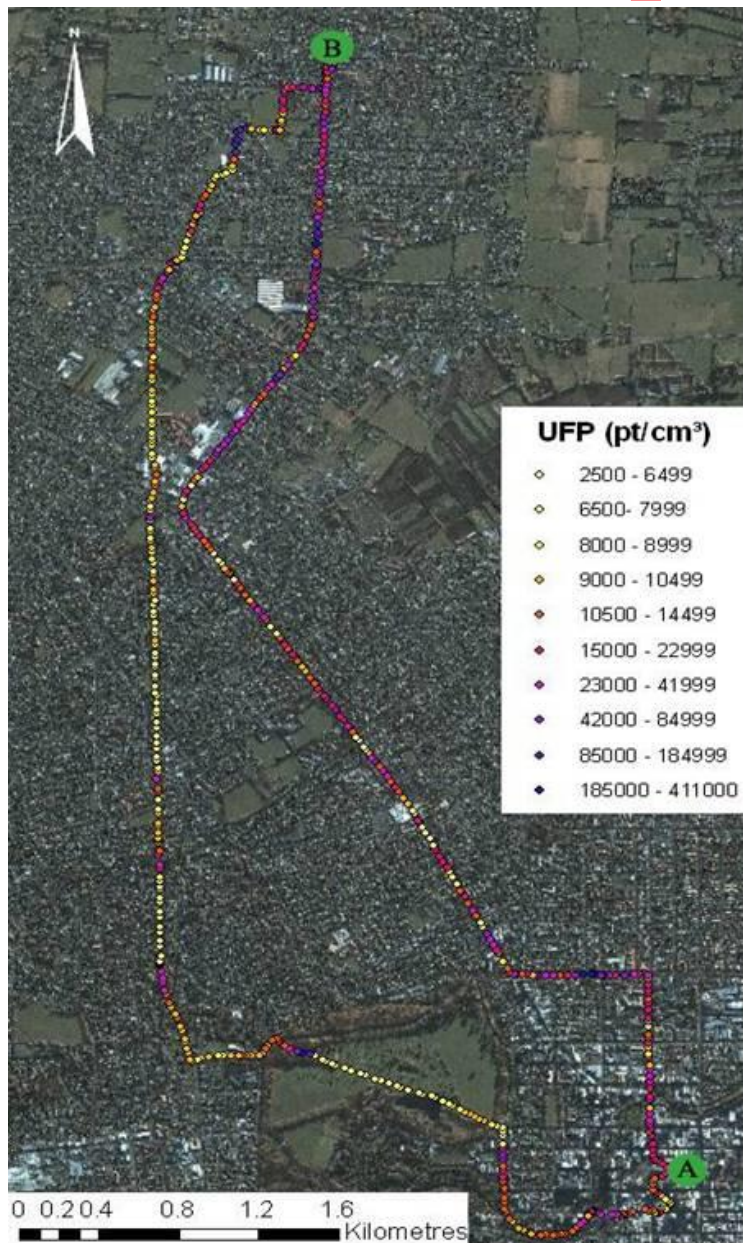
Source: Kuschel et al, Updated Health and Air Pollution in New Zealand Study Volume 1: Summary Report, 2012, Prepared for HRC, MoT, MfE and NZTA.

Pollution exposure



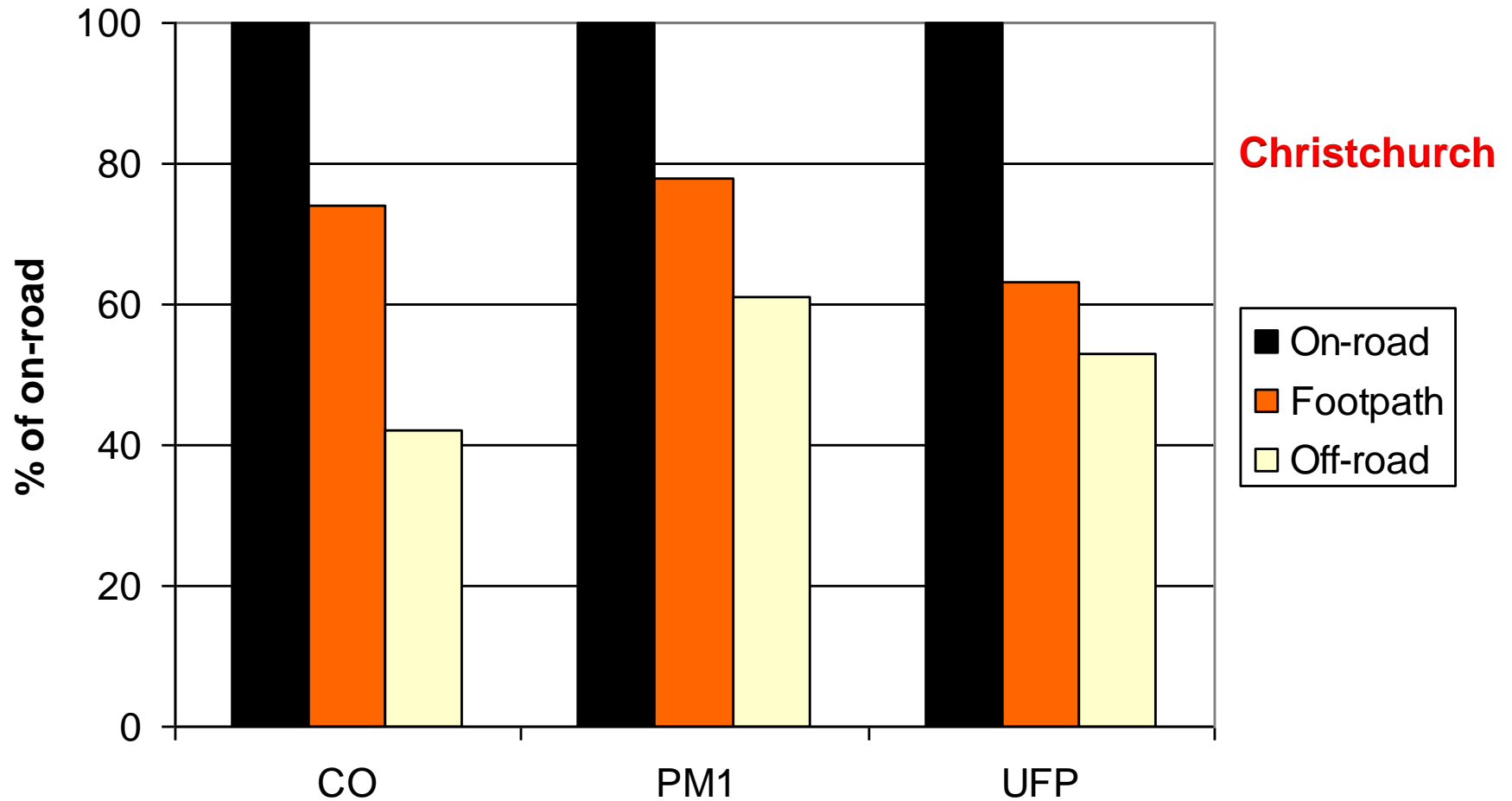
Source: Kingham et al, 2013, Variations in exposure to traffic pollution while travelling by different modes in a low density, less congested city. Environmental Pollution 181, 211-218.

Pollution exposure



Source: Simon
Kingham and
Woodrow
Pattinson

Pollution exposure



Source: Simon Kingham

Pollution exposure

-
- Cyclists are exposed to less pollution than other road users
 - Small amount of separation from traffic significantly reduces pollution exposure

Climate change

- Domestic transport contributes 42 % of total carbon dioxide emissions in NZ
- 17% of ALL carbon emissions are from motor vehicles



**YOU CONTROL
CLIMATE CHANGE.**

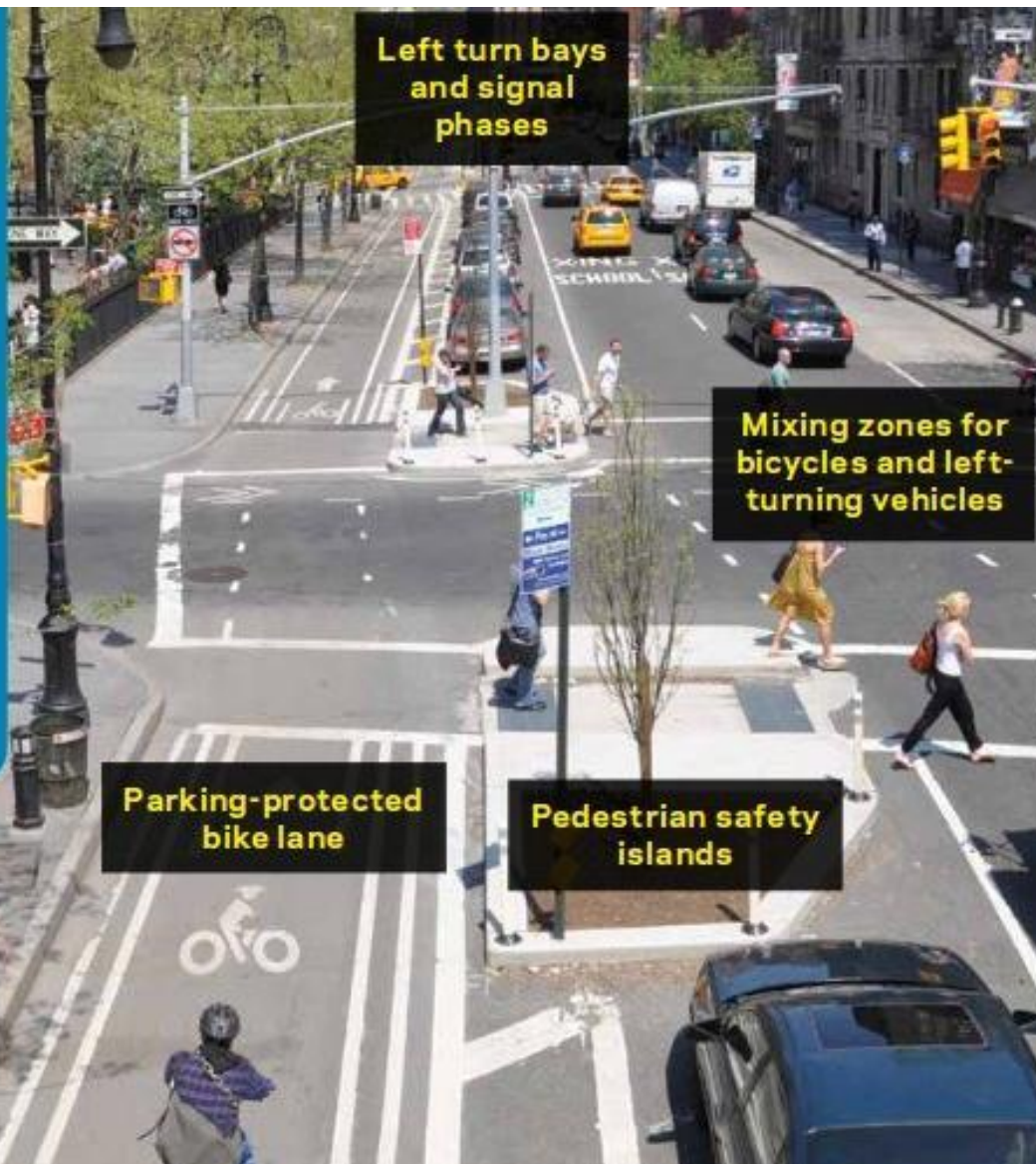
TURN DOWN. SWITCH OFF. RECYCLE. WALK. **CHANGE**

- NZ research: *“transforming urban roads over the next 40 years, using best practice physical separation on main roads and bicycle-friendly speed reduction on local streets, would yield benefits 10–25 times greater than costs”* (Macmillan et al, 2014)
- A 3 yr intervention in 6 cycling demonstration towns found £2.59 benefit for every £1 invested in decreased mortality alone (Sloman et al, 2009)
- Review of sixteen economic evaluations of the health effects of transport interventions that increased walking and cycling found that mean benefit-cost ratio of 5:1 (Cavill et al, 2008)

35% decrease in injuries to all street users (8th Ave)

58% decrease in injuries to all street users (9th Ave)

Up to 49% increase in retail sales (Locally-based businesses on 9th Ave from 23rd to 31st Sts., compared to 3% borough-wide)



New York City Dept of Transportation, Measuring the Street: New Metrics for 21st Century Streets

www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf

Average Customer Expenditures by Mode of Travel and Type of Establishment

Mode	Establishment	Trips per Month	\$ per Trip	\$ per Month	N
Auto	Bar	1.6	25.55	40.21	88
	Convenience	9.9	7.98	79.37	543
	Restaurant	2.2	18.74	41.16	409
	Total	4.5	13.70	61.03	1,040
Bike	Bar	4.9	14.08	68.56	42
	Convenience	14.5	7.30	105.66	63
	Restaurant	3.5	12.08	42.52	48
	Total	7.1	10.66	75.66	153
Transit	Bar	1.8	19.54	35.35	13
	Convenience	10.9	6.91	75.62	53
	Restaurant	3.5	11.52	40.68	36
	Total	5.7	10.15	58.16	102
Walk	Bar	3.1	22.17	68.42	53
	Convenience	12.6	6.13	77.34	254
	Restaurant	2.6	16.74	43.77	131
	Total	5.9	11.25	66.22	438
Total	Bar	2.5	21.78	53.59	196
	Convenience	10.9	7.36	80.40	913
	Restaurant	2.4	17.39	41.78	624
	Total	5.0	12.60	63.46	1,733

NOTE: N = number of respondents.

Clifton K, 2012, Business Cycles: Catering to the Bicycling Market, TRB 280, 26

Road space and congestion



Road building

- National \$12.3bn funding package (2012-15)
 - Roads especially new state highways (Roads of National Significance)
 - 0.43% for walking & cycling (note: now 1.5%)

“this means the funding available for public transport, cycling and walking networks ... will be heavily constrained for much of the early recovery period”

- Christchurch Transport Strategic Plan

Communities that promote sustainable and active can:

- Reduce disparities between the rich and poor
- Promote good neighbourhood
- Enable poor to gain better access to healthy food
- Lead to decreased crime

Source: OECD, 2000, Environmentally sustainable transport. Futures, strategies and best practices.

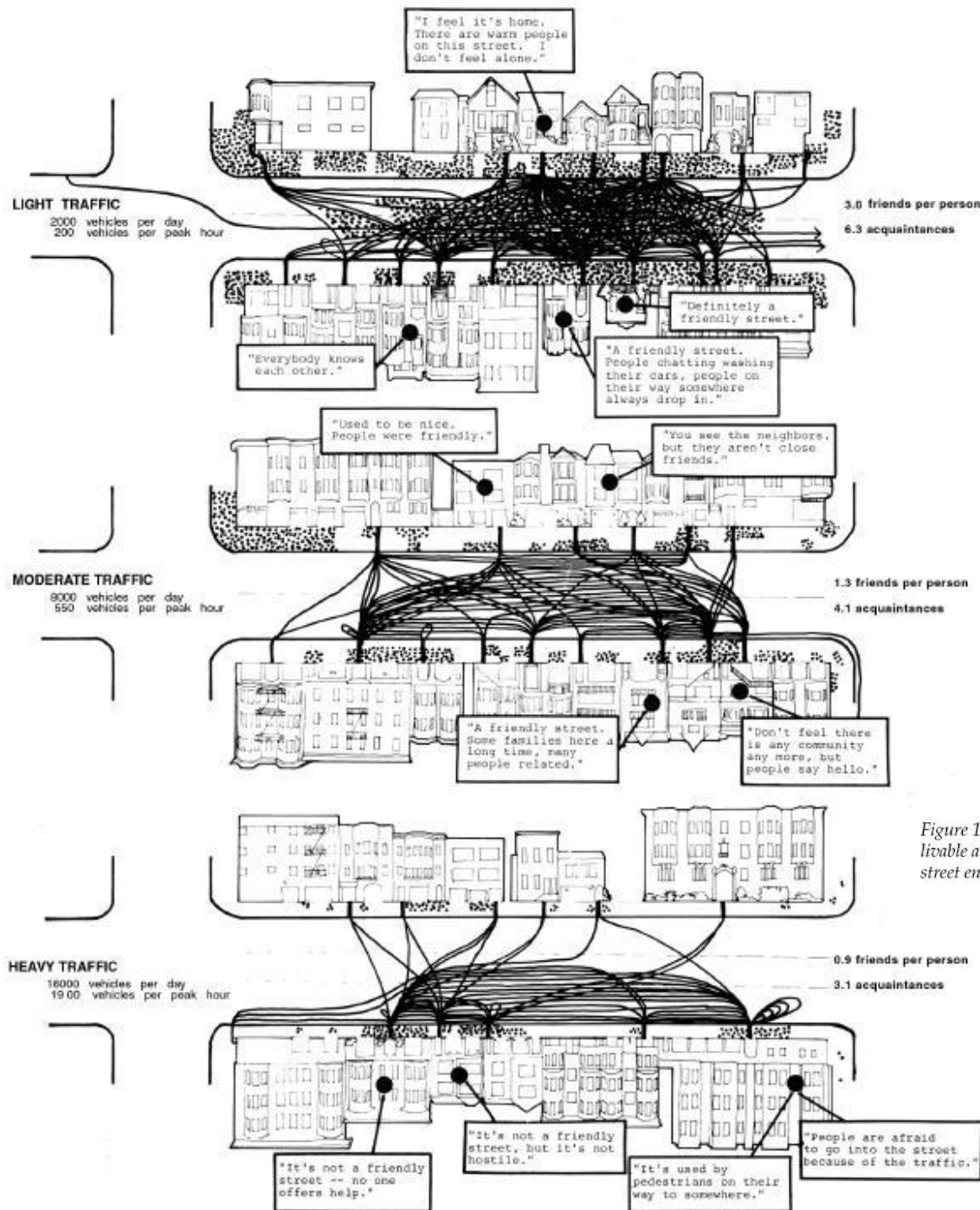
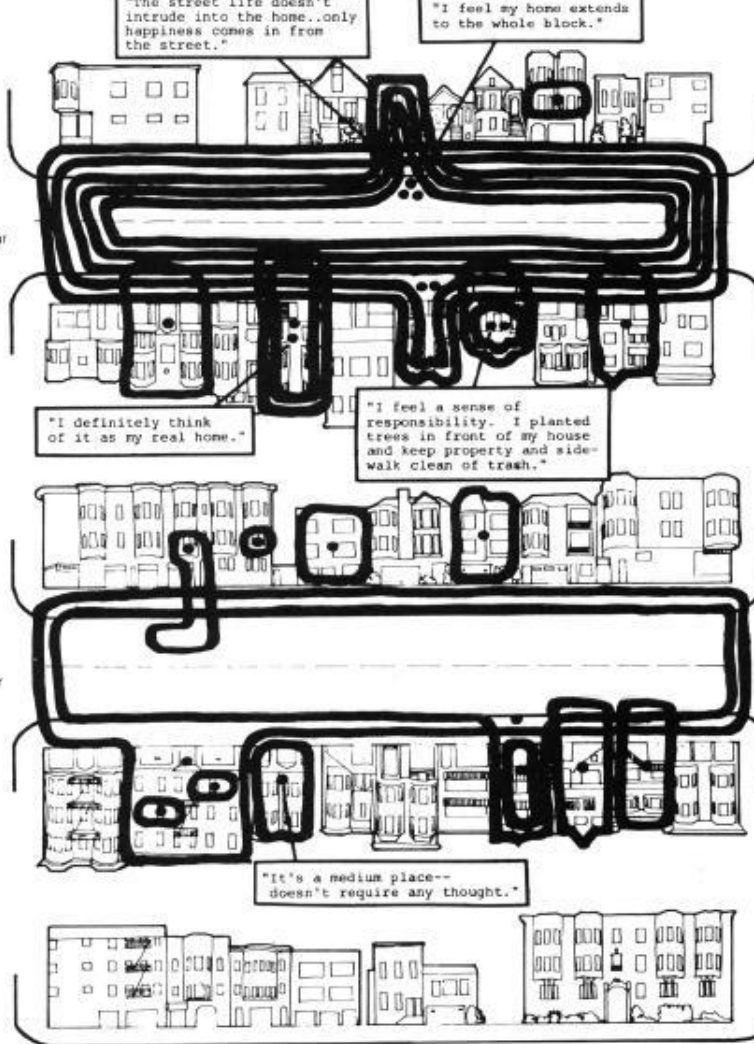


Figure 1: This image shows how community ties can actually be knit together by a street that is livable and inviting — or torn apart when auto traffic noise, pollution, and threats dominate the street environment.

Source: Figure 3, page 21, *Livable Streets*, Donald Appleyard, University of California Press, 1981.

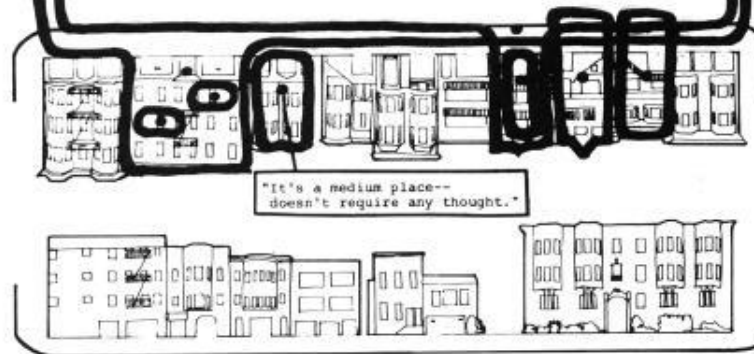
LIGHT TRAFFIC

2000 vehicles per day
200 vehicles per peak hour



MODERATE TRAFFIC

8000 vehicles per day
550 vehicles per peak hour



HEAVY TRAFFIC

16000 vehicles per day
1900 vehicles per peak hour

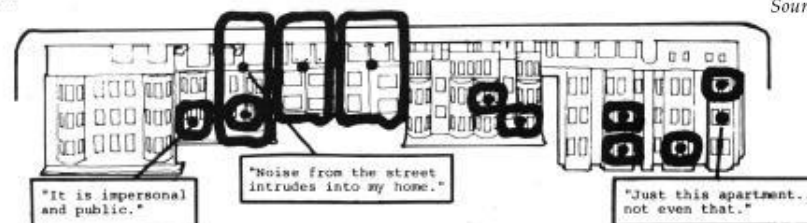
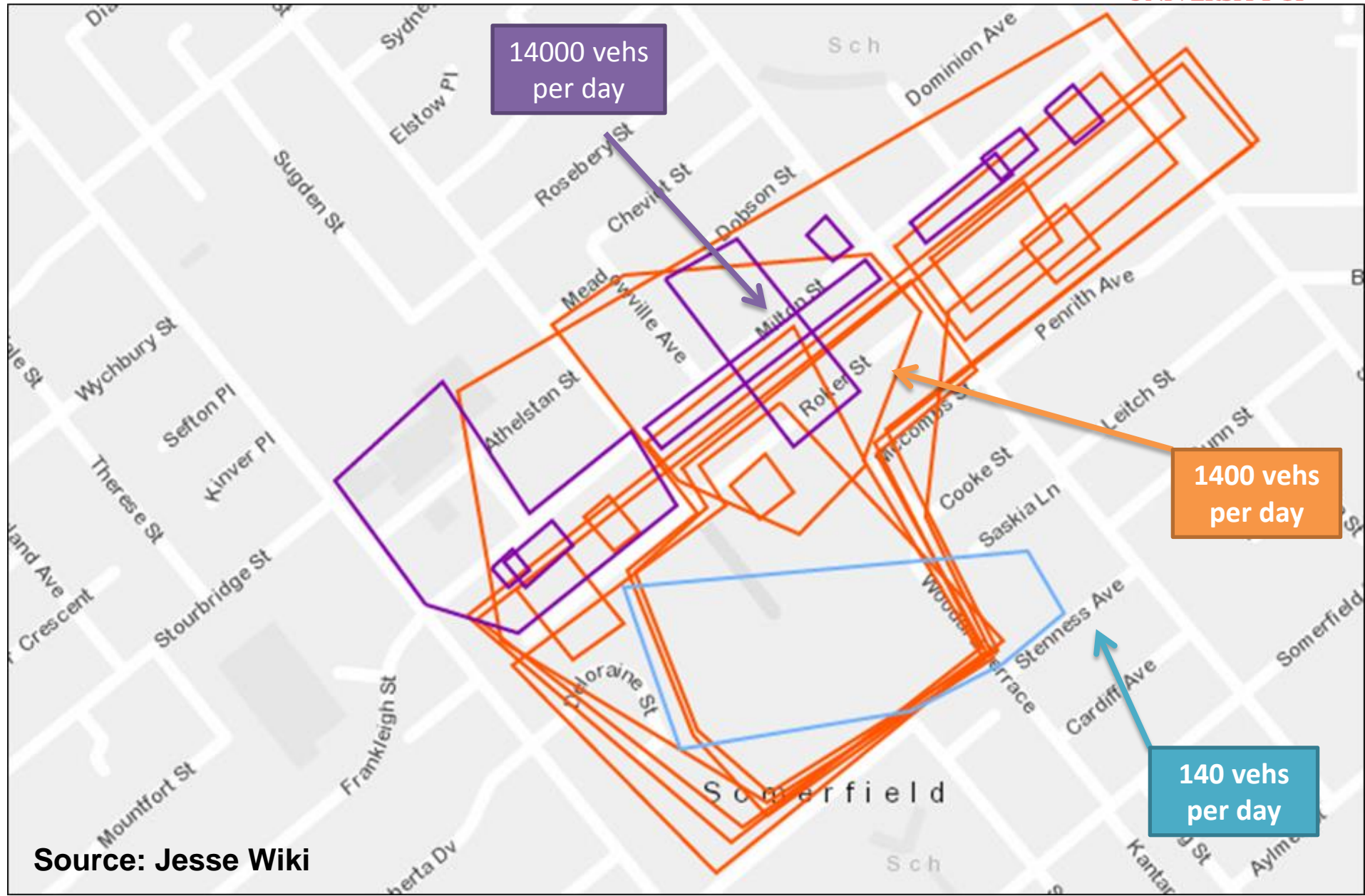


Figure 2: This illustration shows how a resident's sense of their home territories shrinks as traffic grows heavier and faster.

Source: Figure 4, page 23, *Livable Streets*, Donald Appleyard, University of California Press, 1981.

Christchurch



What so we need to do?

-
- More people actively travelling
 - Walking
 - Cycling
 - Public transport

WHAT CAN WE DO TO ENCOURAGE HEALTHY TRANSPORT CHOICES?

Cycling research

Assessment of the type of cycle infrastructure required to attract new cyclists

- Type of infrastructure needed to attract ‘**new**’ cyclists
- Investigate the barriers and motivations for cycling
 - Perceived danger is main barrier!
 - Physical separation was key

Source: Kingham S, Koorey G and Taylor K, 2011, Assessment of the type of cycle infrastructure required to attract new cyclists. NZTA Research Report 449.

Other barriers



Make it attractive



Make it attractive



London



Make it attractive

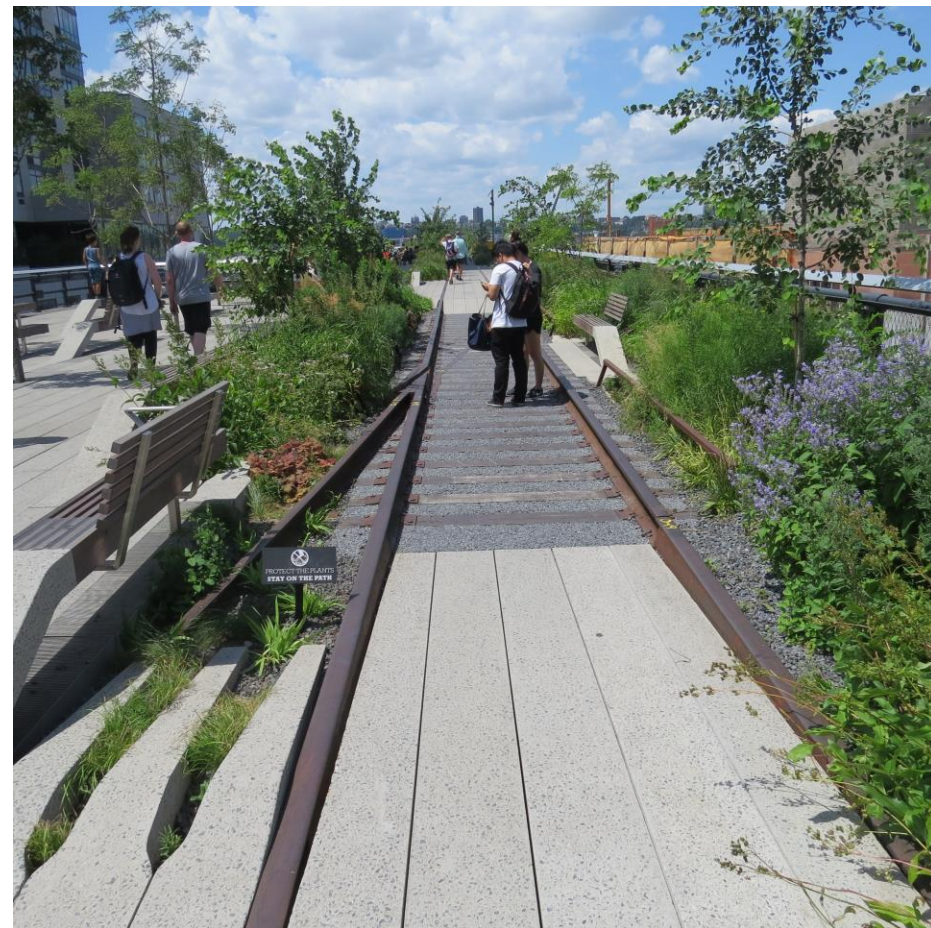


Vancouver



Make it attractive

High Line, NYC

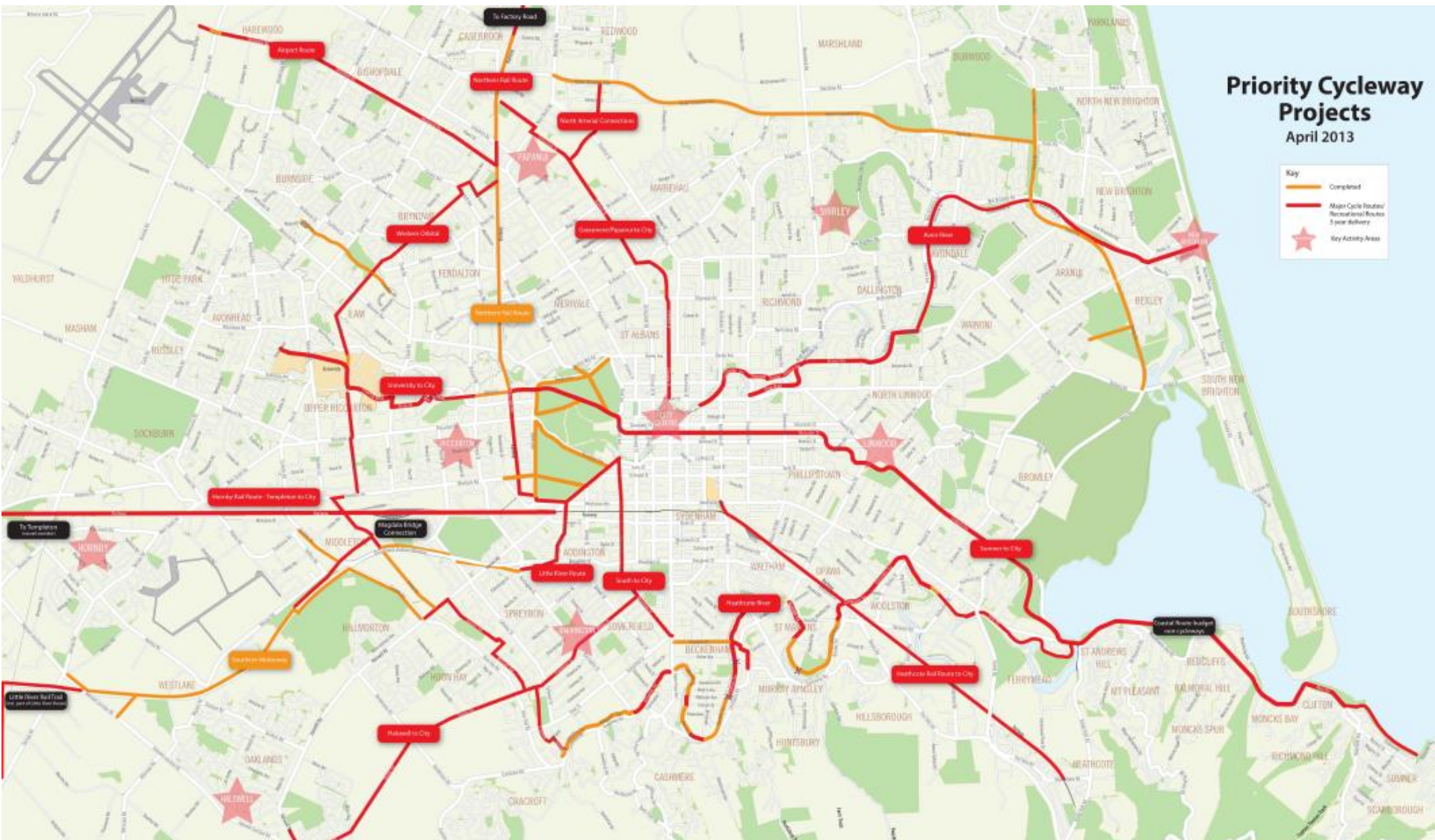


Make it attractive

Luas, Dublin

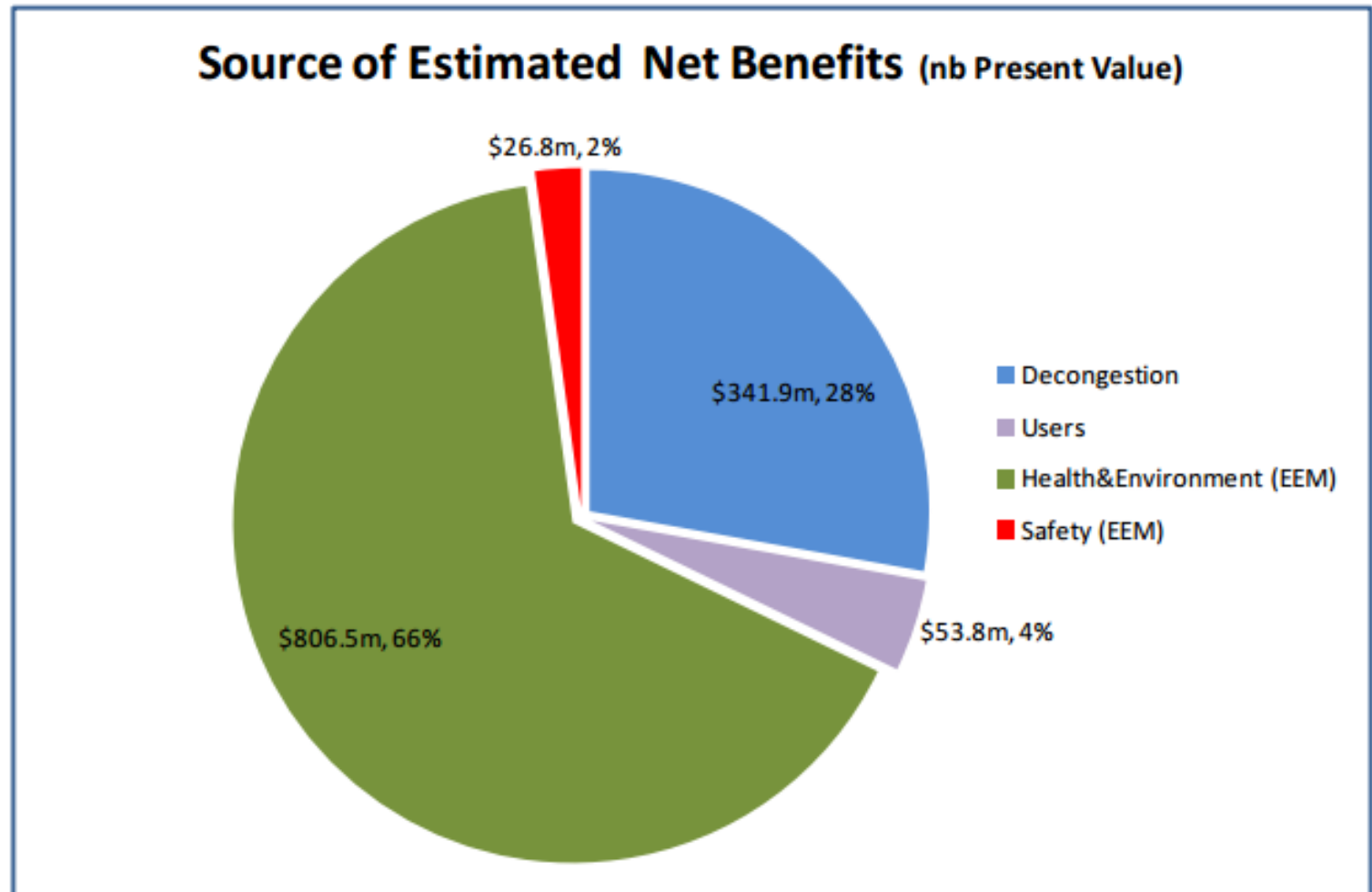


New Cycle Route Programme



Christchurch Major Cycleways

Benefit
cost ratio
of 8!



Roads of National Significance

Table 3: BCRs of the roads of national significance, 2011

Project	BCR	BCR plus WEBs*
1. Puhoi to Wellsford	0.8	1.1
2. Auckland Western Ring route	2.1	2.7
3. Victoria Park Tunnel	3.2	n/a
4. Waikato Expressway	1.4	1.8
5. Tauranga Eastern Link	1.4	1.8
6. Wellington Northern Corridor	1.1	1.4
7. Christchurch Motorways	2.0	2.4
Simple average (all)	1.7	n/a
Simple average (all except 3.)	1.5	1.9

* wider economic benefits

Pickford M, 2013, State highway investment in New Zealand. The decline and fall of economic efficiency. Policy Quarterly 9, 3, 28.

Final Conclusions

-
- Investing in healthy transport is good economic sense
 - Especially health benefits
 - Key is making it an attractive choice
 - Safety is the main barrier for cycling
 - Separation from traffic is the key